Two Eagle Vegetation Management Project

Aquatic Biological Evaluation
(Fish & Aquatic Invertebrates)

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Prepared by:

/s/ *Sarah Brandy*

Sarah Brandy

Fisheries Biologist

La Grande Ranger District

Wallowa-Whitman National Forest

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Introduction

This aquatic specialist report satisfies requirements of Forest Service Manual 2672.4 requiring the Forest Service to review all planned, funded, executed or permitted programs and activities for possible effects on proposed, endangered, threatened or sensitive species by completing a Biological Evaluation (BE). The Region 6 Regional Forester Special Status Species List was last updated in July 2015. The BE process is intended to review the Two Eagle Project in sufficient detail to determine effects of alternatives on species in this evaluation and ensure proposed management actions would not:

- likely jeopardize the continued existence, or cause adverse modification of habitat, for a species that is proposed (P) or listed as endangered (E) or threatened (T) by the USDI Fish and Wildlife Service or NOAA National Marine Fisheries Service; or
- contribute to the loss of viability for species listed as sensitive (S) by USDA Forest Service, Region 6, or any native or desired, non-native species; nor cause any species to move toward federal listing (FSM 2672.4).

The following sources were used during the prefield review phase to determine the presence or absence of aquatic PETS species in the effects area for the Two Eagle Project:

- Wallowa-Whitman N.F. GIS database
- Regional Forester's (R6) sensitive animal list (July, 13, 2015)
- ODFW stream survey and fish survey reports
- Forest Service stream survey reports, Wallowa-Whitman NF, Baker City, OR
- Oregon Natural Heritage Program (ORNHP) database
- Natural Heritage Conservation database (Biosource)
- Oregon Native Fish Status Report (2005)

Analysis Area

The analysis area for aquatic species is the same as the analysis area used for the direct and indirect effects analysis to aquatic habitat in the Two Eagle project area.

Time frames for direct, indirect, and cumulative effects to aquatic species are the same as those used for the direct/indirect effects to aquatic habitat analysis: 1) short-term, 0 - 5 years; 2) mid-term, 5 - 10 years; and 3) long-term, >10 years.

Proposed, Endangered, Threatened and Sensitive Aquatic Species

There are potentially seven Regional Forester sensitive species and critical habitat for one ESA-listed species in the analysis area (Table 1). The Two Eagle project will have no impact to aquatic sensitive species and no effect to ESA-listed fish species the analysis area (Critical Habitat for bull trout only, no occupied habitat) (see Appendix A).

Table 1. Aquatic species with special management status present or suspected to be in the aquatic effects area

Aquatic Species	Status	Documented in Analysis Area
Redband Trout (*Oncorhynchus mykiss*)	R6S, MIS	Yes
Western Ridged Mussel (*Gonidea angulata*)	R6S	Suspected
Inland Tailed Frog (*Ascaphus montanus*)[1]	R6S	Yes
Columbia Spotted Frog (*Rana luteiventris*)[1]	R6S	Yes
Shortfaced Lanx (*Fisherola nuttalli*)	R6S	Suspected
Columbia Pebblesnail (*Fluminicola fuscus*)	R6S	Suspected

Bull Trout (*Salvelinus confluentus*) Critical Habitat	Designated	Yes
California Floater (*Anodonta californiensis*)	R6S	Suspected

[1]See Two Eagle Wildlife Effects Analysis and BE for effects to Columbia spotted frog and inland tailed frog.

Status: MIS = Forest Plan management indicator species, R6S = Region 6 sensitive species, T = Threatened.

Bull Trout (Salvelinus confluentus)

Bull trout have likely been extirpated from the Eagle Creek system since the 1990's. Dams, irrigation withdrawals, and interspecific interactions with introduced brook trout were likely the main reasons for their extirpation. The following information is from the 1997 ODFW Bull Trout Status Report (Buchanan et al., 1997):

> Bull trout were documented in Eagle Creek and West Fork Eagle Creek in creel reports in 1965. Angler reports indicate bull trout were caught in the Martin Bridge section of Eagle Creek (RM 19 – 29) during July, August, and September in the mid-1980s (ODFW, 1993c). Oral histories taken from longtime residents indicate Dolly Varden "bull trout" were common in Eagle Creek in the 1940s and 1950s (Gildemeister, 1989). Sayre (Undated), reporting the results of a 1967 chemical poisoning project, stated that whitefish, rainbow, Dolly Varden "bull trout", and brook trout are found throughout the upper watershed. Extensive snorkeling surveys conducted between 1991 and 1994 failed to find bull trout in Eagle Creek (ODFW, 1995b).

Eagle Creek is located in the Hells Canyon Recovery Unit, Powder River Basin (Mid-Columbia Recovery Unit Implementation Plan, USFWS, 2015). According to the draft recovery plan there is foraging, migrating, and overwintering habitat present in Eagle Creek and Eagle Creek may be considered as a site for reintroducing bull trout (USFWS, 2002, 2015). Eagle Creek is located in the Powder River Basin Critical Habitat Unit (USFWS 2010).

The following recovery actions have been identified that are applicable to the Two Eagle Project (USFWS 2002):

1.1.1) Reduce sediment production from roads and other sources (e.g., mines, over-grazed areas) known to be contributing sediment to streams. Roads and other sources of sediment delivery to streams have been identified in a number of assessments in the Pine-Indian-Wildhorse Core Area and Powder River Core Area (e.g., assessments conducted by the Powder River Basin Watershed Council, U.S. Forest Service, and Southwest Basin Native Fish Watershed Advisory Group). Activities such as removing unnecessary roads, stabilizing road crossings, relocating roads out of sensitive riparian areas, and altering grazing practices should be used to reduce sediment delivery to streams.

> Actions Taken: Minimal road maintenance would occur on roads used for the Two Eagle Project activities, which would correct drainage issues and reduce erosion and fine sediment production (0.4 miles). There are .33 of these miles within the Eagle Creek, Category 1 RHCA. Road treatments are expected to result in a reduction in fine sediment generated by roads (see Water and Aquatic Resource report).

1.2.6) Provide fish passage at road crossings that have been identified as fish passage barriers. Assessments conducted on State- and County-owned roads and some public lands in and Powder River basins have identified road crossings that are barriers to fish passage. Actions to provide fish passage at these sites should be implemented.

> Actions Taken: Two culverts on the 7700 road on Category 1 Jim Creek and Grove Creek are undersized and block fish passage at certain flows. These two culverts would be replaced with appropriately sized culverts following the Oregon Fish Passage Policy (ODFW 2017). An undersized culvert that impedes fish passage would be pulled on upper Jim Creek on the 7700460 road and the road will be closed (gated). These are tributaries to West Fork Eagle Creek, which is

critical habitat for bull trout. The two culverts on the 7700 road are in very close proximity to West Eagle Creek, less than 0.25 acres.

1.5.1) Evaluate potential effects of degraded upland areas on stream and riparian habitats and implement actions to restore historic vegetation and processes where appropriate. Some land management practices (e.g., grazing and timber management) have degraded upland areas or produced conditions that have, or have the potential to, negatively affect stream and riparian habitats. These areas should be evaluated and actions should be taken to restore historic vegetation and processes (e.g., fire regime) to benefit bull trout and bull trout habitat.

Actions Taken: Thinning and prescribed fire activities proposed under the action alternatives for the Two Eagle Project have been designed to restore upland vegetation and fuel loads to HRV levels (see Silviculture and Fuels Specialist reports).

The Two Eagle Project (all alternatives) will have ***no effect*** on CR bull trout because they are not present in the analysis area. Action alternatives proposed under the Two Eagle Project will address three recovery actions for bull trout identified in the 2015 Mid Columbia Recovery Unit Implementation Plan for Bull Trout (USFWS 2015).

Critical Habitat

The USFWS issued a Final Rule for bull trout critical habitat for the coterminous United States on January 14, 2010 (75 FR 2270). The bull trout critical habitat designation includes approximately 5730.8 miles of streams for the Mid-Columbia River Recovery Unit including Eagle Creek and Little Eagle Creek in the project area. The Eagle Creek system has been identified for the reintroduction of bull trout as a recovery action for the species.

Critical habitat includes the stream channels within the designated stream reaches and a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series. If bankfull elevation is not evident on either bank, the ordinary high-water line must be used to determine the lateral extent of critical habitat. The lateral extent of designated lakes is defined by the perimeter of the waterbody as mapped on standard 1:24,000 scale topographic maps.

<u>Primary Constituent Elements for Bull Trout</u>

Based on the needs and current knowledge of the life history, biology, and ecology of bull trout and the characteristics of the habitat necessary to sustain the essential bull trout life-history functions, the following Primary Constituent Elements (PCEs) are essential for the conservation of bull trout and may require special management considerations or protection:

(1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

Impacts to springs, seeps, groundwater sources, and subsurface water connectivity have occurred from livestock grazing and roads in the analysis area. Livestock tend to impact springs and seeps by hoof action when livestock are allowed to congregate in these areas. Subsurface flow has been intercepted by road cuts and ditches that result in minor disruptions of subsurface flow.

Springs and seeps will be protected from adverse impacts using INFISH RHCA buffers from activities proposed under the Two Eagle Project. Buffer width will be 100 feet around the perimeter of springs and seep (Category 4 wetlands). Activities will not occur within these RHCAs.

(2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

Migration corridors for bull trout in the analysis area have been disrupted by irrigation diversions that have resulted in both physical and flow barriers. Water temperatures in West Eagle Creek and Eagle Creek, and tributaries are warmer than the Oregon standard for bull trout.

Water quality will be protected by limiting activities in RHCAs and the use of BMPs and design features to limit the impacts from proposed activities. Increases in water temperature are unlikely because in general, thinning activities would occur outside of INFISH RHCAs for Category 1 and 2 streams. A limited amount of commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m to open patches around cottonwood and western larch, where select trees can be reached from the road prism and removed to open up the stand around these trees. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer.

(3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

Prior to the development of the hydropower system on the Snake River, Eagle Creek supported one of the largest runs of Chinook salmon in the Powder River system (Thompson and Haas, 1960). Eagle Creek and its tributaries also supported a large run of steelhead. Both of these species provide an important food source for bull trout where the three species occur together. The loss of these two species limits the forage base for a reintroduced bull trout population.

Activities proposed under the Two Eagle Project would not have long term direct effects to aquatic habitat and therefore will not affect the potential food base for bull trout.

(4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

Pool habitat and LWD levels in the analysis area are likely lower now after historical intensive timber harvest activities, then prior to that time. While specific habitat data is not available for the project area, trends in changes in LWD and pool habitat in the Pacific Northwest and adjacent areas have likely occurred in the project area. McIntosh et al. (2000) and Quigley et al (1997) documented a general decline pool habitat since the 1930's. Bilby and Ward (1991) found a significant decrease in LWD in managed streams compared to old-growth streams. Cover et al. (2008) documented increases in fine sediment in streams as the result of management activities in the Klamath Mountains of northern California. Timber harvesting activities (including riparian harvesting) and the development of the current road system are likely causative factors in the decline in LWD, pool habitat, and increases in fine sediment compared to pre-settlement conditions.

Activities proposed under the Two Eagle Project will not have measurable effects to aquatic habitat. Short term increases in fine sediment in channels will likely occur on Jim Creek due to one culvert removal, one temporary culvert (installation and removal), and one culvert replacement (removal and installation). Increase in sediment is expected to be minimal and short term. Instream work related to stream crossings and roads would occur during the ODFW in water work to minimize direct effects to fish and fish habitat. Effects to LWD, pool habitat and

streambanks from commercial and non-commercial harvest are not expected to occur because commercial harvest activities will not occur within 200 feet of fish bearing streams.

(5) Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.

Stream temperatures are likely higher than prior to the start of intensive timber harvest activities in the analysis area. While specific habitat data is not available for the project area, trends in changes in stream temperature in the PNW have likely occurred in the project area. For example, Beschta and Taylor (1988) documented a correlation between stream temperatures and the amount timber harvest activity that had occurred in a watershed.

Water temperature monitoring has occurred in the analysis area, but is limited and sporadic over a 10 year period at various sites (See Watershed and Aquatics Report). On Eagle Creek, there are three water temperature monitoring sites, three sites on West Eagle Creek and three other sites on tributaries that flow into West Eagle Creek and Eagle Creek. One year of temperature data was collected on the Philip-Ingle ditch. The ODEQ water temperature for bull trout (<53.6 °F) is not being met in the analysis area or at the two water temperature monitoring stations upstream of the analysis area. Water temperatures in Eagle Creek appear to be naturally warm based on temperature data from Eagle Creek Site 14K.8, which is located near the wilderness boundary.

A limited amount of commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m to open patches around cottonwood and western larch, where select trees can be reached from the road prism. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer. Restricting thinning activities to the outer edges of RHCAs will prevent adverse impacts to existing stream shading along perennial streams in the aquatic effects analysis area. Therefore, measurable increases in stream temperatures will not result from proposed thinning activities.

Proposed burning activities will result in a low severity fire in the outer edges of RHCAs in the project area. There would be no direct ignition in RHCAs in fuel block units, but burning would be allowed to back into the unit. Prescribed burning would occur when fuel moisture levels are high, and fire could back into RHCAs from adjacent upslope areas. These techniques result in low intensity fires that burn in a patchy distribution of burned and unburned areas in RHCAs. Tree mortality from prescribed fire in RHCAs will primarily be understory trees (< 8” dbh). Understory trees of this size typically do not provide significant levels of stream shading.

Few riparian shrubs are also expected to die as a result of the proposed burning because they are present in the moister riparian areas. Where the above ground portions of riparian shrubs are affected, they will likely sprout back relatively quickly because the low severity fire will not be hot enough to kill root crowns.

The proposed burning in RHCAs poses little risk of increasing stream temperatures. Based on the factors discussed above, the Two Eagle Project is unlikely to result in a measurable increase in water temperature and a degradation of water quality in streams in the aquatic effects analysis area.

(6) In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger

substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

Potential spawning areas for bull trout in the Eagle Creek system have not been identified. Eagle Creek in the project area is unlikely to serve as a spawning area for a reintroduced bull trout population due to its location in the system. Where bull trout populations are present in the Wallowa Mountains, bull trout spawning areas are generally located in the upper watersheds of stream systems. In the Eagle Creek system spawning habitat for bull trout would likely be present in Upper Eagle Creek SWS (upstream of the confluence if West Eagle Creek).

Current levels of fine sediment in the six fish bearing streams where substrate/particle size information was collected and analyzed in the analysis area well above the 20% threshold used to indicate adverse impacts to salmonids. The only stream survey that was below this threshold was Eagle Creek (8.1% less than 5.7 mm fines). Short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to result in measurable, long term increases in fine sediment in streams in the analysis area.

(7) A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.

Irrigation diversions have greatly altered the summer hydrograph for West Eagle Creek. The result is significant dewatering (close to 100%) of West Eagle Creek during base flow periods (July-October).

The Two Eagle Project is unlikely to affect runoff or streamflows. As a result of the proposed harvest activities under Alternative 2, 2m or 3, the predicted change in ECA is expected to be minimal since all treatments are thinning and no clear cuts occur in current vegetation management projects.

(8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

Irrigation diversions have greatly altered the summer hydrograph for West Eagle Creek. The result is significant dewatering (estimated at 100%) of West Eagle during base flow periods (July-October). Limited water temperature monitoring has occurred in the Eagle Creek system. Water temperatures in Eagle Creek appear to be naturally warm based on temperature data from Eagle Creek site 14K.8, which is located near the wilderness boundary and upstream of the project area. High water temperatures in West Eagle Creek are likely related to water withdrawals for irrigation purposes (See Stream Temperature, Water Yield and Streamflow; and Cumulative Effects Sections in the Watershed and Fisheries Resource report). MWAT on West Eagle at site West Eagle Creek_L69_WT, below the Phillips Ditch withdrawl, is much higher than the water temperature standard for this creek for bull trout spawning and rearing, <53.6°F. All water temperatures that have been monitored throughout the project area exceed the Oregon standard for bull trout on an annual basis.

The Two Eagle Project is unlikely to affect runoff or streamflows because the project is primarily a thinning project and a minimal amount of acres within RHCAs would be thinned.

(9) Sufficiently low levels of occurrence of predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

Non-native brook trout are present in high numbers throughout the Eagle Creek system in the analysis area. Past stocking of brook trout (*Salvelinus fontinalis*) in the high lakes in the Eagle

Cap Wilderness has been extensive. This has impacted native bull trout populations by hybridization.

Activities proposed under the Two Eagle Project would not improve, but would maintain habitat for non-native fish species. Maintaining habitat for brook trout could result in the expansion of existing populations of non-native fishes.

Alternative 1

Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years as the result of the continuation of current management activities. The current conditions of PCEs are unlikely to support the reintroduction of bull trout to the Eagle Creek system. The presence of an established brook trout population, the current irrigation system (dams and water withdrawals), and the absence of Chinook salmon and steelhead make the reintroduction of bull trout problematic.

The majority of the timbered stands in the project area would be represented by fuel models that are likely to exhibit moderate to severe fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al., 2005).

Alternative 1 ***may affect but would not likely adversely affect*** designated critical habitat for CR bull trout. Current habitat conditions and the presence of an established population of brook trout are unlikely to create conditions conducive to the reintroduction of CR bull trout. These conditions would persist under Alternative 1.

Alternatives 2, 2m, and 3

Activities proposed under Alternatives 2, 2m, and 3 of the Two Eagle Project (transportation system reconstruction, decommissioning roads, commercial harvest, non-commercial/thinning, aspen restoration and prescribed burning activities) ***may affect would not likely to adversely affect*** critical habitat for bull trout. Anticipated effects to PCEs include short-term increases in fine sediment in the analysis area. A long term decrease in erosion from road surfaces will likely occur as a result of the proposed road improvements (see Watershed and Fisheries Specialist Report). This decrease in erosion rates will likely result in minor mid- to long-term decrease in fine sediment in Eagle Creek in the analysis area. Activities proposed under the Two Eagle include maintenance on the 7700000.

There is a moderate risk of cumulative effects to critical habitat for bull trout from the proposed activities and ongoing road maintenance and grazing activities in the analysis area. Both of these activities can result in increases in fine sediment in aquatic habitat. Increases in fine sediment can reduce spawning success and overall fitness of bull trout.

For ongoing road maintenance activities, short-term effects from road maintenance activities are minimized by following INFISH standards and guidelines, and road maintenance BMPs. In the long-term, road maintenance activities reduce adverse effects to aquatic habitat by reducing overall erosion rates from the road system.

For grazing activities, the potential cumulative effects are minimized by meeting INFISH Standards and Guidelines for grazing activities and WWNF PACFISH/INFISH utilization levels.

Redband Trout (Region 6 Sensitive Species, Wallowa-Whitman NF Management Indicator Species)

Redband trout, the resident form of *Oncorhynchus mykiss*, are a Region 6 sensitive species and a WWNF management indicator species. Redband trout in the project area likely shared a common gene pool with Snake River steelhead prior to the construction of the Hells Canyon Dam Complex (Hells Canyon, Oxbow, and Brownlee dams). Redband trout are widely distributed in the Two Eagle project area and occupy all Category 1 streams; approximately 19.8 miles of habitat.

Life History

Redband trout are sensitive to changes in water quality and habitat. Adult redband trout are generally associated with pool habitats, although various life stages require a wide array of habitats for rearing, hiding, feeding, and resting. Pool habitat functions as important refugia during low water periods. An increase in sediment lowers spawning success and reduces the quantity and quality of pool and interstitial habitat. Other important habitat features include healthy riparian vegetation, undercut banks and LWD.

Redband trout generally spawn during the March through May timeframe. Redband redds (i.e. spawning nests) tend to be located where velocity, depth and bottom configuration induce water flow through the stream substrate, often in gravels at the tailout area of pools. Eggs incubate during the spring and emergence occurs from June through July depending on water temperatures. Redband trout may reside in their natal stream or may migrate to other streams within a watershed to rear.

Abundance in Analysis Area

Abundance surveys for redband trout have not occurred in the Eagle Creek system.

Effects of the Alternatives

Alternative 1

Alternative 1 of the Two Eagle Project ***May Impact Individual redband trout and their Habitat***, but will not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. The majority of the timbered stands in the project area would be represented by fuel models that are likely to exhibit moderate to severe fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al., 2005). Adverse impacts to aquatic habitat would likely occur where fine sediment levels exceed the 20% threshold. These levels would likely decrease spawning success for redband trout, and a decrease survival of juvenile salmonids may occur. Increases in stream temperatures can last longer depending on the severity of fire in riparian areas. If water temperatures exceed 64^{o}F for extended periods as a result of wildfire survival of redband trout would likely be reduced.

Alternatives 2, 2m, and 3

Alternatives 2, 2m, and 3 of the Two Eagle Project ***May Impact Individual redband trout and their Habitat*** (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to redband trout may occur as a result of short-term increases in fine sediment (see effects to aquatic habitat section). Short-term, measurable increases in fine sediment would occur as a result of in water work associated with installation and removal of one culvert on a Category 1 Jim Creek, one Category 4 tributary to West Eagle, and one culvert removal on upper Jim Creek on the 7700460 road. In addition, culvert replacements on the 7700 road on Jim Creek and Grove Creek to improve fish passage are expected to have short term increases in turbidity and sediment, this increase is not expected to last more than 48 hours. There would be a long term benefit to redband trout by improving fish passage to habitat upstream.

Current levels of fine sediment in the six fish bearing streams where substrate/particle size information was collected and analyzed in the analysis area well above the 20% threshold used to indicate adverse impacts to salmonids. The only stream survey that was below this threshold was Eagle Creek (8.1% less than 5.7 mm fines). Short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to result in measurable, long term increases in fine sediment in streams in the analysis area. In these areas, short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to

result in measurable, long term increases in fine sediment in streams in the analysis area. The increase in sediment and turbidity, which would directly affect water quality and fish habitat (Category 1; and indirect effects at Category 2 streams) from in channel work, is expected to return to preconstruction levels within 48 hours.

There is a very minimal amount of road work that would decrease erosion from road surfaces as a result of the proposed road improvements (see Watershed and Fisheries Resource Report). This decrease erosion rates will likely result in a mid to long-term decrease in fine sediment in Eagle Creek. Alternatives 2, 2m, and 3 are also expected to maintain the natural fire regime in the long-term in the project area. Both of these long-term outcomes are expected to have beneficial impacts to redband trout and their habitat in the analysis area.

A limited amount of commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m, and 3 to open patches of cottonwood and western larch, where select trees can be reached from the road prism. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer. These distances meet the minimum requirements for RHCA widths for these stream categories and are sufficient to prevent removal of trees that provide stream shading. Restricting thinning activities to the outer edges of RHCAs would prevent adverse impacts to existing stream shading along perennial streams in the aquatic effects analysis area. Therefore, measurable increases in stream temperatures would not result from proposed thinning activities.

There is a moderate risk of cumulative effects to redband trout habitat from the proposed activities and ongoing road maintenance (and road densities) and grazing activities in the analysis area. Both of these activities can result in increases in fine sediment in aquatic habitat. Increases in fine sediment can reduce spawning success and overall fitness of redband trout.

For ongoing road maintenance activities, short-term effects from road maintenance activities are minimized by following INFISH standards and guidelines, and road maintenance BMPs. In the long-term, road maintenance activities reduce adverse effects to aquatic habitat by reducing overall erosion rates from the road system.

For grazing activities, the potential cumulative effects are minimized by meeting INFISH Standards and Guidelines for grazing activities and WWNF PACFISH/INFISH utilization levels.

Western Ridge Mussel (Region 6 Sensitive Species)

Western ridge mussels were designated a Region Forester's Sensitive Species during the development of the 2008 and 2015 R6 Sensitive Species List. Initially, western ridge mussels were suspected to be present on the Wallowa-Whitman NF based a review of occurrence records. Additional record reviews and data searches by WWNF personnel revealed that western ridge mussels were historically present in large numbers in the Snake River and confirmed that western ridge mussels are currently present in the Snake River, Hells Canyon portion, on the Hells Canyon NRA. The current Snake River western ridge mussel population is suspected to be at very low levels compared to pre-European settlement. Relic shells of western ridge mussels were collected by WMO personnel during a monitoring trip on the Hells Canyon portion of the Snake River in October of 2010. Western ridge mussels were also documented in the Powder River (1963) and Grande Ronde River (pre-1929) downstream of the WWNF.

Habitat and Distribution

Western ridge mussels occur in streams of all sizes but are rarely found in lakes or reservoirs. They are found mainly in low to mid-elevation watersheds, and do not often inhabit high elevation headwater streams where western pearlshells are found. They often share habitat with *Margaritifera falcata* (western pearlshell mussel) throughout much of the Pacific Northwest. They inhabit mud, sand, gravel, and cobble

substrates. Western ridge mussels are more tolerant of fine sediments than western pearlshells and occupy depositional habitats and banks. They can withstand moderate amounts of sedimentation, but are usually absent from habitats with highly unstable or very soft substrates. Cursory evidence suggests that western ridged mussels are more pollution-tolerant than other native mussels.

Habitat for western ridge mussels appears to have fairly broad environmental gradients. In the John Day system western ridge mussels are more abundant in the mid and lower reaches of the M.F. and N.F. John Day Rivers compared to western pearlshell mussels (Brim Box et al., 2006). Habitat in the middle reaches of these streams is warmer and has higher levels of fine sediment compared to the upper reaches. In the Salmon River, Vannote and Minshall (1982) found western pearlshell mussels being replaced by western ridge mussels where fine sediment had increased as a result of timber management activities in the watershed.

Threats to western ridge mussels and other species of freshwater mussels include loss of host fish, introduction of non-native fish, dams, channel modification from channelization and suction dredge mining, thermal pollution, chemical pollution, sedimentation and siltation from silvicultural and agricultural practices, water withdrawal and diversion, and livestock grazing in riparian areas. Since western ridge mussels require stable habitats, they may be particularly threatened by dewatering and other activities that cause shifting substrates, water level fluctuations, and seasonal hypoxia or anoxia. Species that live for 20-30 years, as has been suggested for western ridge mussels, often appear to have healthy populations, when in reality only the older adults may be withstanding environmental changes and the population may no longer be reproducing.

Abundance in Analysis Area

The presence of western ridge mussels has been documented on the WWNF but has not been confirmed in the analysis area.

Effects of the Alternatives

Alternative 1

Alternative 1 of the Two Eagle Project will have ***No Impact on Individual western ridge mussels and their Habitat*** (NI), Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current aquatic habitat conditions in the analysis area are not likely limiting for western ridge mussels.

The majority of the timbered stands in the project area would be represented by fuel models that are likely to exhibit moderate to severe fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al., 2005). Western ridge mussels would be vulnerable to impacts from large-scale wildfires that result in large increases in fine sediment and changes in peak flows. Western ridge mussels are adapted to habitats with fine sediment; however, large influxes of fine sediment could result in the burying of mussel beds and the death of individuals. Western ridge mussels require stable streambeds for mussel beds to develop. Increases in peak flows that scour streambed substrates destroy existing mussel beds.

Alternatives 2, 2m and 3

Alternatives 2, 2m and 3 of the Two Eagle Project ***May Impact Individual western ridge mussels and their Habitat*** (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to western ridge mussels may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Current levels of fine sediment in the six streams where substrate/particle size information was collected and analyzed indicate high levels of fines at channel cross sections where these measurements were taken,

exceeding the 20% threshold used to indicate adverse impacts to salmonids and other aquatic species. The only stream surveyed that was below the 20% threshold for fine sediment was Eagle Creek (2016) at 8.1% particles under 5.7mm. In these areas short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to result in measurable, long term increases in fine sediment in streams in the analysis area. In these areas short-term potential increases in fine sediment from proposed transportation activities, prescribed burning, and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternatives 2, 2m, and 3 are unlikely to result in degradation of habitat for western ridge mussels. Increases in fine sediment are expected to be minimal and short term and within habitat tolerances for western ridge mussels.

Under Alternative 2, 2m and 3, the only short term potential measureable increases in fine sediment in aquatic habitat would likely occur in the vicinity of culvert replacement and installation/removal of temporary culverts on Category 1, Jim Creek, and a Category 4 tributary to West Eagle Creek, and replacement of two permanent culverts on a Category 1 Jim creek and Grove Creek. In addition one culvert on upper Jim Creek would be removed. Increased levels of turbidity and sediment are anticipated to return to background, preconstruction levels, within 48 hours of in water work completion.

Overall, a decrease in erosion from road surfaces is expected as a result of the proposed road improvements in Alternative 2 and 3 (see Watershed and Aquatics Specialist Report). This decrease in erosion rates will likely result in a mid to long-term decrease in fine sediment in West Eagle Creek, Jim Creek and Grove Creek in the analysis area. Alternatives 2, 2m and 3 would also maintain a more natural fire regime in the long-term in the project area. Both of these long-term outcomes will have beneficial impacts to western ridge mussels and their habitat in the analysis area.

A limited amount of commercial and non-commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m to open patches of cottonwood and western larch, where select trees can be reached from the road prism. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer. No mechanical equipment would enter RHCAs, therefore, measurable increases in sediment are not anticipated.

There is a moderate risk of cumulative effects to western ridge mussel habitat from the proposed activities and ongoing road maintenance and grazing activities in the analysis area. Both of these activities can result in increases in fine sediment in aquatic habitat. Increases in fine sediment can reduce reproductive success and overall fitness of western ridge mussels.

For ongoing road maintenance activities, short-term effects from road maintenance activities are minimized by following INFISH standards and guidelines, and road maintenance BMPs. In the long-term, road maintenance activities reduce adverse effects to aquatic habitat by correcting drainage patterns and road beds and reducing overall erosion rates from the road system.

For grazing activities, the potential cumulative effects are minimized by meeting INFISH Standards and Guidelines for grazing activities and WWNF PACFISH/INFISH utilization levels.

Shortfaced Lanx (Region 6 Sensitive Species)

Life History

The following species profile was paraphrased from the Xerces Society website ((Xerces Society Website: http://www.xerces.org/giant-columbia-river-limpet/ accessed September 29, 2011):

Shortface Lanx, *Fisherola nuttalli,* is a small pulmonate (lunged) snail in the family Lymnaeidae. Habitat requirements include cold, unpolluted, medium to large streams with fast-flowing, well-oxygenated water and cobble and boulder substrate. These snails are generally found at the edges of rapids. Shortfaced Lanx were historically present throughout much of the Columbia River drainage in Washington, Montana, Oregon, Idaho, and British Columbia. Most populations were extirpated as a result of habitat loss including dams, impoundments, water removal, and pollution. Currently, large populations of *F. nuttalli* persist in only four streams: the lower Deschutes River in Oregon; the Okanogan River and the Hanford Reach of the Columbia River in Washington; and the Snake River in Oregon and Idaho. Additional small populations are found in Oregon in the John Day and Imnaha Rivers, and the lower Columbia River near Bonneville Dam; the Methow River, Washington; and the Grande Ronde River, in Oregon and Washington. Shortfaced Lanx is threatened by habitat alteration and reduced water quality due to dams, impoundments, and siltation and pollution from agriculture, development, industry, and grazing.

Shortface Lanx are generally restricted to relatively large perennial streams ranging from 30- 100 m (98-300 ft.) wide. Within such streams these snails are found primarily at the edges of rapids or immediately downstream from rapids in areas that have suitable substrate. This species requires clean, cold, well-oxygenated water with gravel, cobble, and boulder substrate. In an assessment of Hells Canyon Dam (Snake River, Idaho). Shortfaced Lanx was found on cobbles in higher velocity areas of the stream much more frequently than any other mollusk species; this was considered to reflect the species' preference to attach themselves to hard surfaces in high velocities to avoid competition with other species (Richards et al. 2005). Shortfaced Lanx has not been found in areas with the following characteristics: slow flow; silt or mud substrates; extreme seasonal variations in discharge; an abundance of macrophytes (aquatic plants) or epiphytic algae; a bedrock substrate; or where dredging or mining occurs (Neitzel & Frest, 1992; Frest & Johannes, 1995; Frest, 1999; Richards et al., 2005). The snails feed by scraping algae and diatoms from the surface of rocks and boulders.

Abundance in Analysis Area

The presence of shortfaced lanx has been documented on the WWNF but has not been confirmed in the analysis area.

Effects of the Alternatives

Alternative 1

Alternative 1 of the Two Eagle Project will have ***No Impact on Individual shortfaced lanx and their Habitat*** (NI). Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current aquatic habitat conditions in the analysis area are not likely limiting for shortfaced lanx.

The majority of the timbered stands in the project area would be represented by fuel models that are likely to exhibit moderate to severe fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al., 2005). Shortfaced lanx would be vulnerable to impacts from large-scale wildfires that result in large increases in fine sediment. Shortfaced lanx are adapted to habitats with low to moderate amounts of fine sediment; large influxes of fine sediment could result in the loss of interstitial habitat and the death of individuals.

Alternatives 2, 2m, and 3

Alternatives 2, 2m, and 3 ***May Impact Individual Shortfaced lanx and their Habitat*** (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to shortfaced lanx may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section), if any of these snails occur in the project area.

Current levels of fine sediment in the six streams where substrate/particle size information was collected and analyzed indicate high levels of fines at channel cross sections where these measurements were taken, exceeding the 20% threshold used to indicate adverse impacts to salmonids and other aquatic species. The only stream surveyed that was below the 20% threshold for fine sediment was Eagle Creek (2016) at 8.1% particles under 5.7mm. In these areas short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to result in measurable, long term increases in fine sediment in streams in the analysis area. In these areas short-term potential increases in fine sediment from proposed transportation activities, prescribed burning, and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternatives 2, 2m, and 3 are unlikely to result in degradation of habitat for western ridge mussels. Increases in fine sediment are expected to be minimal and short term and within habitat tolerances for western ridge mussels.

Under Alternative 2, 2m and 3, the only short term potential measureable increases in fine sediment in aquatic habitat would likely occur in the vicinity of culvert replacement and installation/removal of temporary culverts on Category 1, Jim Creek, and a Category 4 tributary to West Eagle Creek, and replacement of two permanent culverts on a Category 1 Jim creek and Grove Creek. In addition one culvert on upper Jim Creek would be removed. Increased levels of turbidity and sediment are anticipated to return to background, preconstruction levels, within 48 hours of in water work completion.

Overall, a decrease in erosion from road surfaces is expected as a result of the proposed road improvements in Alternative 2 and 3 (see Watershed and Aquatics Specialist Report). This decrease in erosion rates will likely result in a mid to long-term decrease in fine sediment in West Eagle Creek, Jim Creek and Grove Creek in the analysis area. Alternatives 2, 2m and 3 would also maintain a more natural fire regime in the long-term in the project area. Both of these long-term outcomes will have beneficial impacts to western ridge mussels and their habitat in the analysis area.

A limited amount of commercial and non-commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m to open patches of cottonwood and western larch, where select trees can be reached from the road prism. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer. No mechanical equipment would enter RHCAs, therefore, measurable increases in sediment are not anticipated.

There is a moderate risk of cumulative effects to shortfaced lanx habitat from the proposed activities and ongoing road maintenance and grazing activities in the analysis area. Both of these activities can result in increases in fine sediment in aquatic habitat. Increases in fine sediment can reduce reproductive success and overall fitness of shortfaced lanx. For ongoing road maintenance activities, short-term effects from road maintenance activities are minimized by following INFISH standards and guidelines, and road maintenance BMPs. In the long-term, road maintenance activities reduce adverse effects to aquatic habitat by reducing overall erosion rates from the road system.

For grazing activities, the potential cumulative effects are minimized by meeting INFISH Standards and Guidelines for grazing activities and WWNF PACFISH/INFISH utilization levels.

Columbia Pebblesnail (Region 6 Sensitive Species)

Life History

The following species profile is paraphrased from USFS / BLM Interagency Special Status / Sensitive Species Program (ISSSSP) website (http://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/sfs-ig-fluminicola-fuscus-2009-02.doc):

Historical distribution is thought to be the Lower Snake and Columbia River drainages in Washington, Oregon, Idaho, British Columbia, and possibly Montana (Frest and Johannes, 1995; Hershler and Frest, 1996). The Columbia pebblesnail was probably extirpated from the middle and upper Columbia River in Washington, Montana, and British Columbia, and may be extinct in the lower Columbia River in Washington and Oregon (Frest and Johannes, 1995). It is still extant in some tributaries in Washington (Okanogan and Methow Rivers).

The Columbia pebblesnail occurs in large tributaries and rivers, on upper surfaces of stable rocks, boulders and bedrock outcrops in fast current, in relatively shallow water. This species requires cold water with high oxygen content. It is not found behind impoundments, or where water is warm, slow, nutrient-enriched or turbid. The Columbia pebblesnail is generally found in areas with few aquatic marcophytes of epiphytic algae.

Impoundments created by dams and other structures which create oxygen-poor conditions can create unsuitable habitat for this species. Waste-water or agricultural run-off into rivers can also create nutrient-rich conditions which are unfavorable to this species. Pollutants from pulp mill effluents or metal smelting discharges has been found to harm Columbia pebblesnails.

Abundance in Analysis Area

The presence of Columbia pebblesnails has been documented on the WWNF but has not been confirmed in the analysis area.

Effects of the Alternatives

Alternative 1

Alternative 1 of the Two Eagle Project will have ***No Impact on Individual Columbia Pebblesnail and their Habitat*** (NI). Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current aquatic habitat conditions in the analysis area are not likely limiting for Columbia pebblesnails.

The majority of the timbered stands in the project area would be represented by fuel models that are likely to exhibit moderate to severe fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al., 2005). Columbia pebblesnails would be vulnerable to impacts from large-scale wildfires that result in large increases in fine sediment. Columbia pebblesnails are adapted to habitats with low amounts of fine sediment and large influxes of fine sediment could result in the reduction in interstitial habitat and the death of individuals.

Alternatives 2, 2m, and 3

Alternatives 2, 2m, and 3 of the Two Eagle Project ***May Impact Individual Columbia pebblesnail and their Habitat*** (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to Columbia pebblesnail may occur as a result of short-term increases in fine sediment.

Current levels of fine sediment in the six streams where substrate/particle size information was collected and analyzed indicate high levels of fines at channel cross sections where these measurements were taken, exceeding the 20% threshold used to indicate adverse impacts to salmonids and other aquatic species. The only stream surveyed that was below the 20% threshold for fine sediment was Eagle Creek (2016) at 8.1% particles under 5.7mm. In these areas short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to result in measurable, long term increases in fine sediment in streams in the analysis area. In these areas short-term potential increases in fine sediment from proposed transportation activities, prescribed burning, and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternatives 2, 2m, and 3 are unlikely to result in degradation of habitat for western ridge mussels. Increases in fine sediment are expected to be minimal and short term and within habitat tolerances for western ridge mussels.

Under Alternative 2, 2m and 3, the only short term potential measureable increases in fine sediment in aquatic habitat would likely occur in the vicinity of culvert replacement and installation/removal of temporary culverts on Category 1, Jim Creek, and a Category 4 tributary to West Eagle Creek, and replacement of two permanent culverts on a Category 1 Jim creek and Grove Creek. In addition one culvert on upper Jim Creek would be removed. Increased levels of turbidity and sediment are anticipated to return to background, preconstruction levels, within 48 hours of in water work completion.

Overall, a decrease in erosion from road surfaces is expected as a result of the proposed road improvements in Alternative 2 and 3 (see Watershed and Aquatics Specialist Report). This decrease in erosion rates will likely result in a mid to long-term decrease in fine sediment in West Eagle Creek, Jim Creek and Grove Creek in the analysis area. Alternatives 2, 2m and 3 would also maintain a more natural fire regime in the long-term in the project area. Both of these long-term outcomes will have beneficial impacts to western ridge mussels and their habitat in the analysis area.

A limited amount of commercial and non-commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m to open patches of cottonwood and western larch, where select trees can be reached from the road prism. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer. No mechanical equipment would enter RHCAs, therefore, measurable increases in sediment are not anticipated.

There is a moderate risk of cumulative effects to Columbia pebblesnail habitat from the proposed activities and ongoing road maintenance and grazing activities in the analysis area. Both of these activities can result in increases in fine sediment in aquatic habitat. Increases in fine sediment can reduce reproductive success and overall fitness of Columbia pebblesnail.

For ongoing road maintenance activities, short-term effects are minimized by following INFISH standards and guidelines, and road maintenance BMPs. In the long-term, road maintenance activities reduce adverse effects to aquatic habitat by reducing overall erosion rates from the road system.

For grazing activities, the potential cumulative effects are minimized by meeting INFISH Standards and Guidelines for grazing activities and WWNF PACFISH/INFISH utilization levels.

California Floater (Region 6 Sensitive Species)

Life History

The California floater is a freshwater bivalve mussel that lives in shallow areas of clean, clear lakes, ponds and large rivers (Taylor 1981) and some reservoirs (Nedeau et al. 2009). Preferred habitat for this species is soft, mud or sand substrate (Clarke 1981) where the mussel can burrow. This species is

primarily sedentary and it filter feeds on plankton and other particulate matter suspended in the water column (reviewed by Vaughn et al. 2008). There have been major declines in this species from their historic range, reasons are thought to include a decline in numbers of native host fish, which the larval life stage of the California floater depends, pollution and sedimentation from land use activities like logging and grazing, predation by non-native fish, and effects of dams. There is potential for this species to occur in the project area in the Powder River Basin. Because typical habitat is large rivers, the highest probability of occurrence in the project area is Eagle Creek.

Abundance in Analysis Area

The California floater has not been documented on the WWNF but the presence of California Floater on the forest is suspected. Therefore it has not been confirmed in the analysis area.

Effects of the Alternatives

Alternative 1

Alternative 1 of the Two Eagle Project will have ***No Impact on Individual California floaters and their Habitat*** (NI). Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years.

The majority of the timbered stands in the project area would be represented by fuel models that are likely to exhibit moderate to severe fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al., 2005). California floaters would be vulnerable to impacts from large-scale wildfires that result in large increases in fine sediment. California floaters are adapted to habitats with low amounts of fine sediment and large influxes of fine sediment could result in interference with feeding and declines in host fish, which this species depend on in their larval life stage.

Alternatives 2, 2m, and 3

Alternatives 2 and 3 ***May Impact Individual California floaters and their Habitat*** (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to California floater may occur as a result of water quality impacts from short-term increases in fine sediment.

Current levels of fine sediment in the six streams where substrate/particle size information was collected and analyzed indicate high levels of fines at channel cross sections where these measurements were taken, exceeding the 20% threshold used to indicate adverse impacts to salmonids and other aquatic species. The only stream surveyed that was below the 20% threshold for fine sediment was Eagle Creek (2016) at 8.1% particles under 5.7mm. In these areas short-term potential increases in fine sediment from proposed prescribed burning, thinning, and transportation system activities are unlikely to result in measurable, long term increases in fine sediment in streams in the analysis area. In these areas short-term potential increases in fine sediment from proposed transportation activities, prescribed burning, and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternatives 2, 2m, and 3 are unlikely to result in degradation of habitat for western ridge mussels. Increases in fine sediment are expected to be minimal and short term and within habitat tolerances for western ridge mussels.

Under Alternative 2, 2m and 3, the only short term potential measureable increases in fine sediment in aquatic habitat would likely occur in the vicinity of culvert replacement and installation/removal of temporary culverts on Category 1, Jim Creek, and a Category 4 tributary to West Eagle Creek, and replacement of two permanent culverts on a Category 1 Jim creek and Grove Creek. In addition one

culvert on upper Jim Creek would be removed. Increased levels of turbidity and sediment are anticipated to return to background, preconstruction levels, within 48 hours of in water work completion.

Overall, a decrease in erosion from road surfaces is expected as a result of the proposed road improvements in Alternative 2 and 3 (see Watershed and Aquatics Specialist Report). This decrease in erosion rates will likely result in a mid to long-term decrease in fine sediment in West Eagle Creek, Jim Creek and Grove Creek in the analysis area. Alternatives 2, 2m and 3 would also maintain a more natural fire regime in the long-term in the project area. Both of these long-term outcomes will have beneficial impacts to western ridge mussels and their habitat in the analysis area.

A limited amount of commercial and non-commercial thinning activities would occur in the outer edges of RHCAs under Alternative 2 and 2m to open patches of cottonwood and western larch, where select trees can be reached from the road prism. Hand thinning would occur on another 6 acres in Alternative 2 and 33 acres in Alternative 2m. These activities would leave a minimum of one site potential tree height no activity buffer. No mechanical equipment would enter RHCAs, therefore, measurable increases in sediment are not anticipated.

There is a moderate risk of cumulative effects to California floater from the proposed activities and ongoing road maintenance and grazing activities in the analysis area. Both of these activities can result in increases in fine sediment in aquatic habitat. Increases in fine sediment can reduce reproductive success and overall fitness of the California floater.

For ongoing road maintenance activities, short-term effects are minimized by following INFISH standards and guidelines, and road maintenance BMPs. In the long-term, road maintenance activities reduce adverse effects to aquatic habitat by reducing overall erosion rates from the road system.

For grazing activities, the potential cumulative effects are minimized by meeting INFISH Standards and Guidelines for grazing activities and WWNF PACFISH/INFISH utilization levels.

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Appendix A – Summary of Effects Determinations for Aquatic Species

Table A-1. Occurrence of aquatic species with special management status in the Two Eagle project area and effects determinations

Common Name	Scientific Name	Status	Occurrence		Effects Determination	
			WWNF	Two Eagle Analysis Area	Alt 1	Alts 2, 2m &3
SR Steelhead	*Oncorhynchus mykiss*	ESA Threatened, WWNF MIS	Present	Not Present	NE	NE
Critical Habitat – SR Steelhead		Designated	Present	Not Present	NE	NE
SR Spring Chinook Salmon	*Oncorhynchus tshawytscha*	ESA Threatened	Present	Not Present	NE	NE
Critical Habitat – SR Spring Chinook Salmon		Designated	Present	Not Present	NE	NE
SR Fall Chinook Salmon	*Oncorhynchus tshawytscha*	ESA Threatened	Present	Not Present	NE	NE
Critical Habitat – SR Fall Chinook Salmon		Designated	Present	Not Present	NE	NE
CR Bull Trout	*Salvelinus confluentus*	ESA Threatened	Present	Not Present	NE	NE
Critical Habitat – CR Bull Trout		Designated	Present	Present	NLAA	NLAA
Inland Redband Trout (all stocks)	*Oncorhynchus mykiss*	R-6 Sensitive, WWNF MIS	Present	Present	MIIH	MIIH
Westslope Cutthroat Trout	*Oncorhynchus clarki lewisi*	R-6 Sensitive	Present	Not Present	NI	NI
Western Ridge Mussel	*Gonidea angulata*	R-6 Sensitive	Present	Habitat Present	MIIH	MIIH
Shortface Lanx (Giant Columbia River limpet)	*Fisherola nuttalli*	R-6 Sensitive	Present	Habitat Present	MIIH	MIIH
Pacific Lamprey	*Entosphenus tridentatus*	R-6 Sensitive	Present	Not Present	NE	NE
Columbia Pebblesnail	*Fluminicola fuscus (=columbianus)*	R-6 Sensitive	Present	Habitat Present	MIIH	MIIH
California floater	*Anodonta californiensis*	R-6 Sensitive	Suspected	Habitat Present	NI	MIIH

Effects Determinations: NI = No Impact, MIIH = May Impact Individuals or Habitat, NE = No Effect, NLAA = Not Likely to Adversely Affect, LAA = Likely to adversely Affect

Table A-2. Habitat Descriptions for Aquatic R6 Sensitive Species (2015 List) for the Wallowa-Whitman NF. D=Documented, S=Suspected

Common Name	Scientific Name	Status on WWNF	Habitat
Shortface Lanx (Giant Columbia River limpet)	*Fisherola nuttalli*	D	Found in unpolluted rivers and large streams, in highly oxygenated, swift-flowing, cold water on stable boulder or bedrock substrates, often in the vicinity of rapids. Macrophytes and epiphytic algae generally rare to absent at sites for the species. Not found in locations with sediment or silt deposition. Documented in Snake River
Columbia Pebblesnail (Ashy Pebblesnail)	*Fluminicola fuscus*	D	Found in larger tributaries and rivers, on upper surfaces of stable rocks, boulders and bedrock outcrops in fast current, in relatively shallow water. Species requires cold water with high oxygen content, so is not found behind impoundments, or where water is warm, slow, nutrient-enriched or turbid. Generally found in areas with few aquatic macrophytes of epiphytic algae. Documented in Snake River
California floater	*Anodonta californiensis*	S	The California floater is a freshwater bivalve mussel that lives in shallow areas of clean, clear lakes, ponds, large rivers and some reservoirs. Preferred habitat for this species is soft, mud or sand substrate where the mussel can burrow. This species is primarily sedentary and it filter feeds on plankton and other particulate matter suspended in the water column.
Western Ridged Mussel	*Gonidea angulata*	D	Western ridged mussels occur in streams of all sizes and are rarely found in lakes or reservoirs. They are found mainly in low to mid-elevation watersheds, and do not often inhabit high elevation headwater streams where western pearlshells are found. They often share habitat with the western pearlshell throughout much of the Pacific Northwest. They inhabit mud, sand, gravel, and cobble substrates. They are more tolerant of fine sediments than western pearlshells and occupy depositional habitats and banks. They can withstand moderate amounts of sedimentation, but are usually absent from habitats with highly unstable or very soft substrates. Cursory evidence suggests that western ridged mussels are more pollution-tolerant than other native mussels.